results of the investigations at Glastonbury, which was published in 1911-12.

The importance of Munro's researches was widely recognised. He was a fellow of the Royal Society of Edinburgh, and an honorary member of the Royal Irish Academy, of the Royal Society of Antiquaries of Ireland, and of the more important anthropological and archæological societies of the Continent.

Munro's work as an archæologist was marked by a cautious reserve and a great sanity in judgment. Yet, on occasion, none could be quicker than he in arriving at a conclusion, which further investigation usually proved to be well within the limits of accuracy. It was characteristic of him that he rarely accepted the results of others without personal investigation, and the great mass of information which he digested and summarised in his published works had been largely tested and checked by his own observations. His thorough mastery of his subject as a practical investigator was suggested even in such a trifle as the way in which he handled a stone implement.

E. N. Fallaize.

IRISH education has sustained a severe loss by the death of the Rt. Hon. W. J. M. Starkie, Resident Commissioner of National Education. For the past twenty-two years Dr. Starkie guided the rather cranky ship of Irish primary education through the troubled sea of clerical management. After a brilliant school career, he obtained the highest classical distinctions at Cambridge University and Trinity College, Dublin, including the fellowship of the latter college. In 1897 he was appointed president of Queen's College, Galway, but after a brief period of office became Resident Commissioner and *ex-officio* chairman of the Board of National Education. As a member of the Viceregal Commission on manual and practical instruction, he played an important part in framing the scheme of reformation of the aims and methods of Irish education, which later he was called upon to administer. Upon his shoulders rested in large measure the responsibility of effecting the change from a mechanical system of payment by results to an inspection system with a broader view of the functions of a school. Knowing the magnitude of the forces opposed to change, he displayed conspicuous courage in carrying far-reaching reforms to a successful issue. His address on "Recent Reforms in Irish Education" at the Belfast meeting of the British Association in 1902 was a strenuous and courageous exposure of the weaknesses of Irish education; it aroused much bitter criticism from the clerical managers.

Dr. Starkie was also chairman of the Board of Intermediate Education, and thus occupied a unique position in Irish education, which probably owes more to him than to any one man during the last half-century. He was a brilliant essayist and one of the first Greek scholars of his time.

Notes.

AN important statement on the development of the synthetic dye industry was made by the chairman of the Colour Users' Association at Manchester on July 20. Mr. Vernon Clay referred to two very urgent reasons why the dye industry in England should be developed to the very utmost, one being the real necessity that existed from the commercial and industrial side, and the other the necessity from the point of view of national security. Only a country possessing a large dye-making plant which could alternatively be used for the production of the various organic chemical substances employed in war could hope to be in a proper position in any future struggle, for the next war would be essentially a chemists' war, and start on a very large scale. The Government has recognised that for national security it is essential that synthetic dye factories equal to those of any other possible hostile nation shall be in existence, and to further this object the President of the Board of Trade has stated that the pledge to the synthetic dye industry, that the importation of synthetic dyes shall be permitted only under licence, will be given effect to in legislation as quickly as possible. Although the British output of dyes already exceeds the pre-war importation from Germany, there are several important dyes which are not yet manufactured in this country, and a licensing scheme such as is promised appears to be the only proper means of fostering the industry and of encouraging manufacturers gradually to extend their range until the country is absolutely self-contained as regards its production of dyes and the necessary intermediate products.

THE question of the universities and the excess profits duty was the subject of debate in the House of Lords on July 21. By the concession already proposed by the Chancellor of the Exchequer the position is roughly this:—While the excess profits duty will be charged at 60 per cent., the State, as a matter of fact, will bear 12 per cent. of any charitable contributions made by a business firm. Earl Grey, however, in the hope of inducing private benefactors to make larger subscriptions, wished the Government to show more liberality and to consider the *total* remission of the duty so far as it affected the universities. On behalf of the Government the Earl of Crawford could not grant the further concession, but, in the course of his reply made an important announcement regarding university grants-in-aid. He stated that the Chancellor of the Exchequer was prepared to submit to Parliament an increase of the present vote of 1,000,000*l.* to 1,500,000*l.* in the Estimates for the year 1921–22, and, in addition, to consider the advisability of proposing to Parliament a further non-recurrent sum to assist the universities in meeting the grievance of those of their senior members who were precluded from profiting to the full by the benefits of the federated superannuation scheme of the universities. No pledge was given in either case, and both proposals are subject to the overriding necessities of national finance.

Apparently the consideration of any supplementary grant within the present financial year is not contemplated. While it is reassuring to find that the Chancellor of the Exchequer recognises the clamant needs of the universities, there will be no little disappointment that provision more appropriate to the present needs, especially in the matter of superannuation, is not made.

ON July 21 the King received at Buckingham Palace the principal members of the British Empire Forestry Conference, which sat in London during the preceding fortnight. The members included delegates from Great Britain and Ireland, India, and the various Dominions and Colonies. Lord Lovat, president of the conference and chairman of the Forestry Commission of the United Kingdom, presented the delegates separately to his Majesty; and Mr. H. R. Mackay, Forest Commissioner, Victoria, and representative of the Commonwealth of Australia, read an address to the King, who in his reply congratulated the Home Forest Authority on its joining hands so soon with foresters in other parts of the Empire. He referred to the work of universities and colleges and to the experience gained in the Crown woods and private plantations as having laid a foundation on which it is incumbent to build. The King pointed out the peculiar difficulty of forestry work, which demands, perhaps, more imagination, more patience, and more foresight than any other industry, and considered it an immense advantage that the experience of all parts of the Empire should be brought into a common stock and made available for all. Forestry, directed as it is to checking reckless consumption of the world's supply of timber and to teaching and encouraging thrifty use and prudent replacement, represents a great work for the common good. The conference will result both in practical improvements in the operations of the Forestry Services at home and overseas, and in a truer and wider appreciation of their value to the Empire at large.

WITH the advice and assistance of the U.S. National Research Council, a co-operative body of scientific experts on injurious insects and plant diseases and of manufacturers of insecticides, fungicides, and general chemicals and apparatus used in fighting the enemies of field and orchard crops has just been organised under the name of the Plant Protection Institute. The purpose of the institute is to promote the general welfare by supporting and directing scientific research on the pests of crops, shade trees, and ornamental plants and on the methods of their control, and by furthering co-operation between the scientific investigators and the manufacturers of chemicals and appliances, especially for the sake of effecting standardisation and economy in the production and use of the means of fighting pests. Also it expects to aid in the dissemination of scientifically correct information regarding the control of injurious insects and plant diseases. Much excellent work along this line is now being done by Government and State organisations, but a further advance can be made by introducing a wider co-ordination and co-operation of the efforts of both the scientific men and the manufacturers of control devices. It is in this general direction of co-operative work that the Plant Protection Institute expects to be most active.

TWO general excursions, both on Saturday, August 28, have been arranged in connection with the Cardiff meeting of the British Association. One party will drive through the Wye Valley to Tintern, where lunch will be taken; thence to Llanover, where they will be the guests of Lord Treowen for tea (price of ticket 19s.). The other party will cross the Bristol Channel to Weston-super-Mare, and drive to Cheddar, Wells, and Glastonbury, returning to Cardiff by boat in the evening (price of ticket 21s.). Owing to the difficulty of arranging transport, the local secretaries will be much obliged if members intending to join either of these excursions will kindly signify their intention of doing so as soon as possible. Both these are whole-day excursions, and it will be impossible for members to be brought back to Cardiff until rather late in the evening. Letters should be addressed to the Local Secretaries, British Association, City Hall, Cardiff.

THE eighteenth annual meeting of the general committee of the Imperial Cancer Research Fund, held on July 22, of which we publish an account in another column, shows that the Fund has returned to full activity after the interruptions of the war. We are glad to note that our premier organisation for cancer research mainly concerns itself with the purely scientific aspects of the problem. The detailed study of cell-metabolism now in progress, as foreshadowed in the Director's report, should, if energetically pursued, lead to advances in general biology of permanent value, apart from their application to the special problems of cancer. It is gratifying to find that the Fund is again playing its part as a central organisation of international collaboration in cancer research.

THE one hundred and first annual meeting of the Société Helvétique des Sciences Naturelles will be held at Neuchâtel on August 29–September 1. The following are among the papers to be presented:—"Les aciers au nickel dans l'horlogerie," C. E. Guillaume; "Die Vegetation des Diluviums in der Schweiz," Prof. H. Brockmann-Jerosch; "Ueber das Kropfproblem," Prof. Hedinger; "Les fouilles de la Grotte de Cotencher," Prof. A. Dubois; and "Die Gesteinsassociationen und ihre Entstehung," Prof. P. Niggli. Particulars of the meeting may be obtained from Prof. O. Fuhrmann, Université, Neuchâtel, or Prof. E. Piguet, rue de la Serre 2, Neuchâtel.

THE Rayleigh Memorial Committee has decided that the memorial to the late Lord Rayleigh in Westminster Abbey shall take the form of a mural tablet to be erected near the memorials to Sir Humphry Davy and Dr. Thomas Young. The execution of the tablet will be entrusted to Mr. Derwent Wood. It is expected that after all expenses are met there will be a balance remaining, and this the committee proposes shall be used to establish a library fund at the Cavendish Laboratory, Cambridge, with which Lord Rayleigh was closely associated.

The autumn meeting of the Iron and Steel Institute will be held at Cardiff on September 21–24, under the presidency of Dr. J. E. Stead. An influential reception committee, of which the Right Hon. the Earl of Plymouth has consented to act as chairman, Mr. E. Steer, vice-president of the South Wales Institute of Engineers, as deputy chairman, and Mr. D. E. Roberts as honorary secretary, has been formed to carry out the necessary arrangements.

Soon after the signing of the armistice in 1918 the United States Government sent a Commission to France to investigate the war developments in mining and metallurgy and to observe the methods taken to re-establish the collieries and steel works destroyed by the enemy. Mr. G. S. Rice, chief mining engineer of the Bureau of Mines, was a member of this Commission, and a valuable account of his observations was communicated to the Franklin Institute last December, and is published in the June issue of the Journal of the institute. The descriptions of the mines and the methods adopted in working them are confined mainly to the Pas-de-Calais district, and many views of the destroyed surface works are given. The author is of opinion that the most satisfactory way of reconstructing the mines is to cut up and remove the tangled ironwork at the top of the shafts, which are almost all badly cratered by explosives, and to reline the shafts themselves at those points where they pass through water-bearing strata and where they had in consequence been blasted by the enemy in order to drown the mines. He believes this method will be less costly than sinking new shafts. He has every confidence in the ability of the French engineers to deal successfully with the problem.

In his report submitted to the joint session of the Oriental Societies at Paris Sir George Grierson describes the progress which has been made in the Linguistic Survey of India. What may be called the Cadastral Survey of these languages is now complete except for the Deccan and for Burma, of which a separate survey is in contemplation. The work so far done includes 179 languages and 544 dialects. The account of the so-called gipsy languages, many of which are secret dialects, is ready for the press. That dealing with the Eranian languages contains much interesting matter, particularly the account of Ormuri, a tongue with Dardic affinities, spoken by a small tribe settled in the heart of the Afghan country. At present Sir George Grierson is engaged upon a comparative vocabulary, representing 168 words—numerals, pronouns, common nouns, and declensional and conjugational forms giving all the equivalents in all languages which have been studied in the course of the Survey, with a few words in some non-Indian languages, such as Japanese, Chinese, Manchu, Turki, Arabic, Avesta, and Persian. As a supplement to the Survey a number of gramophone records illustrating the pronunciation of various Indian languages is in course of preparation, and these are being distributed to institutions where they will be available for students. The progress made in this great work is thus most important.

An interesting series of lectures was delivered recently at the London School of Economics and Political Science by Dr. B. Malinowsky, a young Polish anthropologist, who, as a member of the Robert Mond Ethnographic Expedition, spent a considerable time among the people of eastern New Guinea, in particular in the Trobriand Archipelago. Dr. Malinowsky's investigations throw fresh and welcome light on primitive economics. Trade is organised by the influence of the chief, associated with a magician in charge of each department of communal activity. "Primitive economics, as exemplified by the Trobrianders, present a picture different from, and more complex than, that usually assumed. National economy, as a system of free exchange based on untrammelled competition, where value is determined by the play of supply and demand, does not exist. But a system of production, exchange, and consumption does exist, socially organised and subject to definite customary rules. In addition to activities connected with the quest for food, there are many others, such as circular trading and ceremonial enterprise, in which the natives perform organised work, controlled by their conceptions of wealth and value, and therefore distinctly economic. In all these activities there is an interplay of chieftainship, kinship, and social organisation. Ceremonial life, magic, myth, and tribal law control and are controlled by economic elements." Anthropologists will await with interest a full account of this remarkable economic and social organisation. Part of the evidence is summarised in a paper by Dr. Malinowsky, 'Kula: The Circulating Exchange of Valuables in the Archipelagoes of Eastern New Guinea," published in the July issue of *Man*.

Whilst the Crocker Land Expedition explored to the north-west of Greenland, the Canadian Arctic Expedition of 1913–18 investigated the district lying east and west of the Mackenzie River. The mollusca the Canadians brought back have now been studied and described by Dr. W. H. Dall (Report Canad. Arctic Exped., 1913–18, vol. viii., part A, 1919, pp. 29, 3 plates). This collection is of special interest, because, save for a partial exploration about 1863 by Mr. R. Macfarlane, of the Hudson Bay Co., the fauna to the eastward of the Mackenzie River delta has remained entirely unknown. It was thought that probably the great outpour of fresh water from the river might have proved a barrier to the passage of marine species from the western Arctic Ocean, and that the eastward fauna would show a considerable infusion of Greenlandic forms. The result of the study of the collection proved otherwise, for of the hundred Arctic species collected over the whole area in question—a collection, therefore, far richer in numbers than that of the Crockford Expedition (see Nature for July 8, p. 593)—only five were characteristically Eastern Arctic. Apparently the narrow, tortuous, ice-blocked passages which lead to the Greenland seas are accountable for the failure of the Eastern Arctic mollusca to colonise in the Bathurst region, while the open sea to the west readily gives access to the Western Arctic forms. Only six new marine species are established, and these are fully described and figured. A few fresh-water forms were met with, including a new species of Physa, which is of interest as being the most northern species of the genus. Still, it should be noted that the closely allied *Aplexia hypnorum*, of circumpolar distribution, occurs with it. The Limnæas proved extremely puzzling, and Dr. Dall is inclined to consider that both the form known as *caperata*, Say, and the *vahli* of Beck may be only boreal mutations of the well-known *Limnaea palustris*, Müller. Full lists of all the species collected at the several stations and from Pleistocene deposits are also included in this important paper.

MR. W. WYBERGH has brought forward evidence, including that of marine mollusca, to show that the coastal limestones of the Cape Province (Trans. Geol. Soc. S. Africa, vol. xxii., p. 46, 1920) are by no means entirely due to the cementation of recent dunes. The well-known dune limestone seems to have been formed over and against a more ordinary and shelly marine limestone, which constitutes the true Bredasdorp formation, and is of late Pliocene or Pleistocene age.

PAPERS on the Crown Colony of Sierra Leone are comparatively rare. Mr. F. Dixey (Trans. Geol. Soc. S. Africa, vol. xxii., p. 112, 1920) describes evidences of Pleistocene movements of elevation, with the formation of a coastal plain along nearly the whole coast of the peninsula or Colony proper, merging on the east into low ground that extends far into the Protectorate. Parallel raised beaches show that the uplift was intermittent. The highest beach is some 300 ft. above the sea. Four photographic views accompany the paper.

THE question of the persistence of genera is raised by Dr. C. D. Walcott in describing a remarkable series of floating cyanophyceous algæ from the Middle Cambrian Burgess Shale of British Columbia (Smithsonian Miscell. Coll., vol. lxvii., No. 5, 1919). Morania, one of his new genera, so closely anticipates the structure of the modern Nostoc that only a feeling that they cannot have been fully identical leads the author to propose a new generic name. The illustrations are presumably from photographs of specimens coloured by hand before reproduction; but they are, to say the least, surprising.

MR. LOUIS RENOUF, of the Bute Museum, Rothesay, writing in the *Museums Journal* for April–May on various technical methods, including the mounting of wet specimens under watch-glasses and petri dishes, remarks on the difficulty of obtaining such glasses with even edges, and nicely finished plates on which to mount them. The difficulty led to the discovery that there was "no glass-planing plant in the whole of Great Britain." If this be so, the discovery accounts for a good deal that scientific workers have had to contend with in obtaining glass apparatus (at whatever price) from British firms.

"THE Rainfall in the Island of Formosa" has recently been issued by the Government-General of Formosa, with a summary of meteorological observations at Taihoku and five other observatories. Since the meteorological service was established in 1896 rainfall stations have been added as available from year to year. There were only 28 at the end of 1903, and there are now 135. Every 106 square miles of Formosa has, on the average, one station. Most of them are attached to various Government Departments. At 83 out of the 135 stations records are available for ten years or more. The average annual rainfall over the island is 2486 mm., the greatest fall, 7176 mm., being at Kashoryo, situated on a mountain slope at the head of a valley open to the north-east a few miles south of Kelung; this spot is said to be probably the most rainy in the Far East. The minimum annual rainfall for Formosa is 1050 mm. at Rochikuto, in Taichu, on the west coast. There are two rainy seasons, one during winter along the extreme north coast associated with the north-east monsoon, the other in summer on the mountain districts in South Formosa, largely due to typhoons and thunderstorms. Typhoons occasion a considerable variation in the rainfall according to their track and proximity, the track being usually from south-east to north-west. The heaviest rainfall in twenty-four hours in Formosa is given as 1034 mm. at Funkiko on August 31, 1911, which is the same day as that of the flood in Taihoku shown in the frontispiece of the publication under notice. The heaviest of the excessive rains in different parts of the world, quoted for comparison, are Charra Ponjee, India, 1036 mm., June 14, 1876, and Baguio, Philippines, 1168 mm., July 14, 1911. Comprehensive tables and maps are given showing the monthly and seasonal mean rainfall and the number of rainy days, also the five-day mean rainfall at six observatories from the results for twenty-two years, and the diurnal range, intensity, and duration of rain.

WE have received copies of the second biennial Hurter and Driffield memorial lecture delivered by Prof. Alex. Findlay before the Royal Photographic Society on May 11, and the Hurter memorial lecture recently delivered by Mr. F. F. Renwick before the Liverpool Section of the Society of Chemical Industry. Prof. Findlay discoursed on the properties of colloids in general, and especially with reference to photographic processes and materials. He says: "In the production of the photographic plate, . . . from the moment of mixing the solutions to the final stage of ripening of the emulsion, we have a complex series of changes taking place in a delicately balanced and complex colloidal system, in which coagulation, peptisation, solution, and adsorption doubtless all take part. . . In the production of the latent image . . it seems probable that we are again dealing with phenomena of adsorption." Mr. Renwick deals with three characteristics of the latent image: "(1) The possibility of physically developing an image on a fixed and washed plate; (2) the possibility of transferring and subsequently developing (both physically and chemically) latent images from the silver salt in which they are formed to another, by changing the former chemically into a less soluble silver salt; and (3) the destructibility of the latent image by the further action of light itself under certain conditions." He gives the details of some very interesting experiments of his own, and concludes that in the "most highly sensitive photographic plates we are dealing with crystalline silver bromide in which, besides gelatine, some highly unstable form of colloidal silver exists in solid solution, and *that it is this dissolved silver which first undergoes change on exposure to light.*" He finds a reasonable explanation of solarisation "by assuming a peptising action on the part of the later-formed chemical products of light action (bromine, hydrobromic acid, etc.) with formation of a photohalide relatively rich in dissolved silver, but almost undevelopable."

A NEW radio call signal used by the Post Office is described by Major Shaughnessy in the *Electrical Review* for July 16. Until recently one of the drawbacks to radio reception was that it was always necessary for an operator to be listening, as there was no method of making the received signals operate a loud calling device. There are many outlying small radio stations in this country in islands and lightships the number of calls on which is so small that it would not justify the expense of having an operator always in attendance. The Post Office, by using a simple valve amplifier, a Turner thermionic relay, and a retardation device in series, has successfully employed the weak radio currents to ring a bell. In order to call the station a long "dash" of 15 seconds duration is sent. During this time a condenser at the receiving station is slowly charged through a 3-megohm resistance. After about twelve seconds the condenser is practically fully charged, so that when the signal ceases and the tongue of the relay moves back to the spacing stop the discharge of the condenser deflects a second relay, and this causes a bell to ring. This condenser device has been used by the Post Office for several years on land lines to call the operators, and is found to be very efficient. Trials of the set have proved that it is practically impossible for "jamming" or atmospheric disturbances to actuate the apparatus. It has been fitted on the P.O. cable ship *Monarch*, and even with heavy "jamming" has proved successful up to a hundred miles. This calling device can be applied for sending the distress signal at sea known as the S.O.S. signal. It will obviously extend the use of radio communication to much smaller ships than at present, as the saving of operators' wages considerably reduces the cost of maintenance.

Two recent articles in the *Engineer* (July 2 and 9) describe at some length the hydro-electric power works at the Great Lake, Tasmania, which is situated approximately at the geographical centre of the island at an altitude of 3350 ft. above sea-level. From the southern end of the lake the River Shannon finds an outlet some two miles west of the bed of the River Ouse, and the two streams flow in fairly parallel courses for some distance. But the fall of the River Ouse is much more rapid than that of the River Shannon, with the result that, while at a point opposite the middle of the lake the Ouse has an elevation of 120 ft. above it, a few miles south the Ouse has fallen to considerably more than 1000 ft. below the Shannon. A short connection between the two rivers at this point enables a very high head of water to be obtained. For the initial installation only the water from the Great Lake catchment area has been utilised, but it is now in contemplation to divert the head-waters of the Ouse into the lake, and by this means a total capacity of 70,000 h.p. will be available at the turbine shafts. The dam across the southern end of the Great Lake, which at present impounds the water to a height of 11 ft. above the sill, will be raised to give an effective height of 40 ft. The existing power station at Waddamana contains two 5000-h.p. and two 8000-h.p. turbines, all of the Boving type; three more 8000-h.p. machines are under construction, and will shortly be installed. In order to develop the total fall a second station will be formed at a higher level, where a head of 250 ft. is available and a serviceable capacity of 12,000 h.p. is at present running to waste.

WE notice that, in consequence of the continued increased cost of production, the published price to non-fellows of the society of the Journal of the Royal Society of Arts has been raised to 1s.

MESSRS. R. AND J. BECK, LTD., 68 Cornhill, London, E.C.3, inform us that they have obtained a supply of mounted specimens of the scales of the Test Podura, *Lepidocyrtis curvicollis*, which is recognised as being one of the best tests of high-power microscope object-glasses. These scales have been for long unobtainable, and the new supply will be welcomed by many microscopists.

THE research on automobile steels carried out by the research committee of the Institution of Automobile Engineers has now been brought to a successful conclusion. It is hoped that the report, which was approved at a meeting held on July 21, will be ready for issue by about the end of August, when a further announcement in regard to price, etc., will be made.

THE "Rough List" (No. 359) of books on natural history just issued by Messrs. Bernard Quaritch, Ltd., 11 Grafton Street, W.1, will be of interest to collectors of first and rare editions, for among the thousand or so volumes offered for sale are many treasures. There is also a good sprinkling of ordinary editions listed at low prices. Practically the whole ground of natural history is covered by the catalogue; there are, besides, sections on mathematics, mineralogy, palæontology, and physics.

A BULLETIN issued by the Department of Industries, Madras, entitled "The Manufacture of Glue in the Tropics from Tannery Refuse," was noticed in NATURE of February 5 last, p. 611. The director of the Department now informs us that the pamphlet has been placed on the market so that the information contained in it may be widely known. The pamphlet is priced at 1 rupee, and copies can be purchased from the Superintendent, Government Press, Mount Road Branch, Madras.